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Testing the modernization hypothesis and the socialist ideology hypothesis: a comparative sibling analysis of educational attainment and occupational status

ABSTRACT

In this study, we present a comparative sibling analysis. This enables us to test two major social mobility hypotheses, i.e. the modernization hypothesis and the socialist ideology hypothesis. We employ survey data on brothers in England, Hungary, the Netherlands, Scotland, Spain, and the USA, covering a historical period from 1916 till 1990. Results show that the effects of parental social class on educational attainment are smaller in technologically advanced societies, and that the effects of parental social class on occupational status are smaller in social-democratic and communist societies. In addition, the total family impact on occupational status declines with modernization. But overall, we observe that the family of origin has not lost its importance for its sons' educational attainment and occupational status yet.

KEYWORDS: Social stratification; status attainment; sibling analysis; comparative research

INTRODUCTION AND THEORETICAL BACKGROUND

In this study, we present a comparative sibling analysis of educational attainment and occupational status. We build on Blau and Duncan's (1967) classic status attainment model that is a milestone in social mobility research. The status attainment model describes the process of stratification; inequalities in family background lead to inequalities in educational attainment, which in turn lead to inequalities in occupational status. A comparative sibling analysis gives more insight into this stratification process, since it combines two powerful perspectives. First, sibling analysis enables us to estimate the *total* impact of the family of origin on educational attainment and occupational status. We will elaborate on this

and other advantages of sibling analysis in the next section. Second, a comparison between countries and historical periods makes it possible to test two major social mobility hypotheses, i.e. the modernization hypothesis and the socialist ideology hypothesis.

Modernization is the general term for the (mainly) economic processes driven by technological change that took place during the last century. Rapid technological innovation and economic development led to a more complex and differentiated labour market in which efficient selection processes were needed (Kerr, Dunlop, Harbison, and Meyers 1960; Treiman 1970). According to technological-functionalist theory (Collins 1971), the labour market has changed into one with a growing need for highly qualified employees working in specialized jobs in the industrial and service sector, and the educational system has expanded to satisfy this growing need. Efficient selection processes imply meritocratic principles; it is not family background but individual qualities that determine school success and occupational achievement in modern societies. A shift from 'ascription' towards 'achievement' (Blau and Duncan 1967) has taken place in order to get the right person in the right place. The modernization hypothesis predicts that the impact of the family on educational attainment and occupational status will be smaller and that the effect of educational attainment on occupational status will be larger in technologically advanced societies. Not the family of origin, but personal intellectual abilities will determine educational and occupational outcomes.

There are some additional structural arguments why the family of origin is losing its importance for status attainment in modern societies. First, the very expansion of educational systems in technologically advanced societies makes that individual educational careers are longer, which will negatively affect the importance of the family in educational careers. The rationale behind this is that the impact of the family of origin is smaller in later stages of the educational career (Mare 1980). Second, occupational inheritance has lost ground in technologically advanced societies, because of a decreasing size of occupations that are traditionally transmitted from generation to generation (mainly through material possessions), like farmers and the petty bourgeoisie. These structural changes on the labour market will have contributed to the decreasing impact of the family on occupational status.

It is not only economic modernization, but also cultural modernization that has given way to the weakening impact of the family of origin on educational attainment and occupational status in modern societies. First, hand in hand with technological change, there has been a shift from particularistic to universalistic values (Parsons 1951); meritocratic principles have become dominant. Second, many of the main functions of the family have weakened, like the socialization of children (Allan 1985; Popenoe 1988). In modern societies, parents have less influence on their children's decisions as children increasingly make their own choices.

Next to economic and cultural modernization, political circumstances

are important factors to explain differences in status attainment between countries and historical periods. Parkin (1971) advanced the hypothesis that educational equality and occupational mobility will be larger in countries where left-wing parties have been in the government. The main argument underlying this socialist ideology hypothesis is that societies with a social-democratic or communist government have implemented social reforms to reduce social inequality (Heath 1981). The most important reforms in this respect are those that meant to reduce educational inheritance: '(...) the educational system is a powerful mechanism for altering the balance of advantages between classes [...] and it] is also particularly suitable as an instrument of social change in so far as, in most countries, it is directly under the control of the state' (Parkin 1971: 109). It was especially in societies with a communist regime that educational reforms were introduced to achieve this goal, like the quota systems that favoured children of working-class parents (Simkus and Andorka 1982). Educational reforms have also been carried out in societies with a social-democratic government, although they may have been less severe. An example is the lowering of schooling costs, particularly for the financially disadvantaged. These reforms will have resulted in a smaller impact of the family of origin on educational attainment in social-democratic and communist societies.

Other social reforms aimed to reduce occupational inheritance. Again, these reforms were most visible in communist societies. The legal and hereditary transmission of titles was abolished, and the state expropriated land and industrial possessions in most communist societies (Parkin 1971). The egalitarian ideology of communism made that allocation of occupational positions was in principle based on educational credentials only. Although no direct measures to reduce occupational inheritance through property have been introduced in societies with a social-democratic government, the egalitarian ideology is present in the occupational allocation process.

Finally, social-democratic and communist governments have tried to equalize income distributions through measures as taxation and the provision of state welfare (Parkin 1971). Erikson and Goldthorpe (1992) argue that egalitarian reward systems lead to a more equal basis for competition between children from different class backgrounds. Moreover, these children are likely to have comparable levels of ambition, because there is less 'normative differentiation' along class lines in these societies.

The socialist ideology hypothesis thus predicts that social reforms will diminish the effect of the family of origin on educational attainment and occupational status in social-democratic and communist societies. At the same time, the effect of educational attainment on occupational status will be larger in these societies. All this will be reinforced by the family policies implemented in these societies. These policies can be characterized as being very 'liberal' (Collins and Coltrane 1991). Important functions of the family, like the socialization of children, are taken over by state

institutions, which makes that parents have less influence on their children's decisions.

In short, the modernization hypothesis predicts a smaller family impact in technologically advanced societies, whereas the socialist ideology hypothesis predicts a smaller family impact in social-democratic and communist societies. In addition, the hypotheses predict that the effect of educational attainment on occupational status will be larger in technologically advanced societies and in social-democratic and communist societies. These hypotheses call for a test in a comparative approach. Most comparative mobility research to date has used loglinear models (Ganzeboom, Luijkx and Treiman 1989; Wong 1994); comparative research on the status attainment model itself has been limited to two or three countries (for an overview see Treiman and Ganzeboom 1990). An exception is the study of Treiman and Yip (1989) in which the status attainment model is estimated for 21 countries. Their results corroborated the modernization hypothesis, but the socialist ideology hypothesis was not tested. Rijken (1999) employed data on 20 countries, and observed that ascription is less important in the process of son's first job status attainment in state-socialist societies. She, however, did not distinguish social-democratic societies from other western democratic societies. In this study, we test both the modernization hypothesis and the socialist ideology hypothesis employing sibling data from several countries and historical periods.

ADVANTAGES OF SIBLING ANALYSIS

Following Blau and Duncan (1967), students of the status attainment process have usually operationalized family background by father's educational attainment and occupational status. Some have recognized that the original two indicators of family background offer a rather limited perspective on the impact of the family of origin. They have started to include additional variables in the status attainment model when studying a single country. Among these additional variables are mother's educational attainment and occupational status (Hauser and Featherman 1977; Kalmijn 1994), parents' income (Sewell and Hauser 1975), parental cultural resources (De Graaf 1986), parental aspirations and expectations (Sewell and Hauser 1980), intellectual ability (Jencks et al. 1972; Taubman 1976), and school quality (Coleman et al. 1966). It is, however, difficult to apply this strategy in a comparative perspective. Moreover, no matter how many variables are added to the model, it is impossible to measure *every* relevant element of family background. The *total* impact of the family on educational attainment and occupational status will be underestimated if only effects of measured aspects are studied.

This problem can be overcome by using information on the educational attainments and occupational statuses of more than one sibling in a family. Hauser and others (e.g. Hauser and Mossel 1985; Hauser and Wong 1989)

developed appropriate sibling models that estimate the total impact of the family by the degree of similarity between siblings in educational attainment and occupational status. The underlying argument of these sibling models is that if the total effect of family background is stronger, siblings will be more alike in educational attainment and occupational status. The total family effect combines all aspects of the environment as shared by the siblings. This shared environment first of all consists of parental resources, like economic and cultural resources. Genetic inheritance forms an important part too, because brothers and sisters have, on average, half their genes in common (Scarr and Grajek 1982). In addition, siblings may influence each other by being role models, teachers and facilitators (Benin and Johnson 1984). The major advantage of sibling analysis thus is that it combines the effects of all factors related to the family of origin, and that it assesses the total effect of the family without measurement problems.

Apart from this major advantage, sibling analysis has three additional advantages. First, sibling models make it possible to determine the contribution of measured aspects of the family to the total family impact. Previous sibling research showed that traditional indicators of parental social class, like parents' educational and occupational status, account for about half of the total family impact (e.g. Hauser and Wong 1989). A large part of the total family impact is thus not covered when only measured aspects of the family are included. The remaining unmeasured part of the total family impact consists of parental resources, genetic inheritance, intersibling effects, and other aspects of shared environment that are not related to the social class measures included. A second additional advantage is that sibling analysis is statistically very powerful. It produces more reliable family background effects, because it deals with information on more than one sibling per family. Finally, sibling analysis gives an unbiased estimation of the effect of educational attainment on occupational status. This effect tends to be overestimated in traditional research, because family background is inadequately controlled for (Bowles 1972). Assessing the total impact of the family renders the 'pure' effect of educational attainment on occupational status.

Previous sibling studies of the effects of family background on educational attainment and occupational status have been limited to single countries; e.g. the Federal Republic of Germany (De Graaf and Huinink 1992), Hungary (Toka and Dronkers 1996), the Netherlands (Van Eijck 1996), Norway (Sweetser 1975), Sweden (Erikson 1987), and the USA (Hauser and Mossel 1985). Comparisons between historical periods are scarce and limited to a few specific countries only. In this study, we present a comparative sibling analysis to test the modernization hypothesis and the socialist ideology hypothesis. In our view, a test of these hypotheses for only the measured aspects of the family (i.e. the traditional indicators of parental social class) does not tell the whole story. It is equally important to see whether the hypotheses also hold for the *total* impact of the family on educational attainment and occupational status.

DATA AND OPERATIONALIZATION

To test the hypotheses mentioned, we collected survey data from several countries. The data had to meet the following criteria in order to be included in our analyses. First of all, they had to be based on nationally representative samples. Second, they had to contain detailed information on age, educational attainment, and occupational status of the respondent and at least one of his siblings. And third, the datasets had to include information on father's and mother's educational attainment, father's occupational status, and the number of siblings in a family. Nine datasets from six countries (England, Hungary, The Netherlands, Scotland, Spain, and the USA) met these criteria. An overview of the datasets can be found in Appendix A.

From these nine datasets, we selected all families with at least two brothers of age 25–65. It is inherent in sibling analysis that families with only one child are excluded from the analysis. The reason why we did not include women¹ is rather practical. In three datasets, there was only information available on men and their brothers. The other datasets did contain information on female siblings, but many women were housewives and thus not gainfully employed. Furthermore, research has shown that the occupational status attainment of women depends on gender specific mechanisms, like dual responsibilities (Treiman and Roos 1983). The age restriction of 25 was based on the assumption that most individuals will have completed their education at that age and have started their occupational careers. Including respondents younger than 25 would bias the sample towards lower levels of education. The upper limit of 65 was chosen to improve the comparability of the surveys, for this is the lowest age limit in the nine datasets. Another advantage of including only those siblings that were 65 or younger is that one minimizes the possibility of selection bias due to differential mortality (Ganzeboom and Treiman 1994).

After these selections, we made pairs out of each possible combination of brothers (ordered by age). Obviously, more pairs of brothers could be formed in large families than in small families. In order to prevent overrepresentation of brothers from large families, the pairs were weighted by a factor 'one divided by the number of pairs formed in a family'. These weighted sibling-pairs were our units of analysis. Note that this weighting procedure is a conservative one; the real statistical power lies between the number of pairs formed and the number of families.

Brothers' educational attainments were made comparable across datasets by following the approach of Ganzeboom and Treiman (1994). Their educational attainments were measured in 'virtual years of education', that is the minimum number of years it takes to get to a certain educational level. For comprehensive educational systems as in England and the USA, we used the years of education claimed by the respondent or the years known to correspond to specific levels of educational attainment. For multidimensional tracked educational systems like in most continental

European countries, we coded the years of education associated with important educational categories and interpolated the remaining categories. In this way, the relative order of levels was maintained. The educational attainment of the parents was constructed out of the highest educational attainment of the father and the mother, and was also measured in 'virtual years of education'.

In order to get an international comparable occupational status measure, national occupation codes were first matched with the International Standard Classification of Occupations 1988 (ILO 1990). These ISCO88-codes were then scored according to the International Socio-Economic Index (ISEI) scale, which is based on objective characteristics of occupational categories, namely education and average income. This ISEI-scale was developed by Ganzeboom, De Graaf and Treiman (1992), and was updated by Ganzeboom and Treiman (1996). Father's occupational status was measured in the same way, and was based on his occupation when the respondent was 12–16 years of age. Because some datasets had quite a few missing observations on this variable (up to 11.1 per cent for the American data), and because we wanted to preserve as many cases as possible, we chose to impute the missing observations on father's occupational status per country cohort combination. The imputations were based on estimates obtained by regression analyses on the parent's educational attainment and – if known – father's age. It would have been more appropriate if we used external instrumental variables for this imputation, but these variables were not available. Additional analyses, however, showed that results were about the same before and after the imputation. We therefore conclude that imputation is legitimate here.

Family size was operationalized by the total number of brothers and sisters in a family. If no direct information on the number of siblings was available, we counted the number of siblings included in the dataset.

In this study, we do not only compare between countries, but also between historical periods. Therefore, we constructed labour market cohorts with a range of 15 years (1916–1930 1931–1945 1946–1960 1961–1975, and 1976–1990). These labour market cohorts are based on the year in which the brothers made the transition into the labour market, because it is in those years that the impact of the family on occupational status can be expected to be at its maximum. The starting year in the occupational career is defined as the birth year added by the school leaving age plus two. When the two brothers in a pair entered the labour market in different historical periods, we took the average of their starting years and allocated them to the cohort to which this average belongs.

The combination of a country and a historical period (labour market cohort) can be seen as a society. In principle, 30 societies could be formed; six countries times five labour market cohorts. Data was lacking on eight of these combinations, which means that we have 22 societies at our disposal. Table I displays the number of male sibling-pairs per society with full information on all variables mentioned. The table shows that there is a large

TABLE I: *Number of male sibling-pairs per society^a*

	1916–1930	1931–1945	1946–1960	1961–1975	1976–1990	Total
England	1291	1881	1310	–	–	4482
Hungary	223	3445	4987	3238	120	12013
The Netherlands	–	–	353	576	279	1208
Scotland	395	834	907	139	–	2275
Spain	–	59	78	90	–	227
USA	–	66	146	200	83	495
Total	1909	6285	7781	4243	482	20700

Note:

^a a society is defined as a country-labour market cohort combination

variety in the number of cases. This unequal distribution would bias the results of our analysis, as the outcomes would be governed by the larger datasets. We, therefore, reweighed the pairs of brothers in such a way that each society has the same number of cases, i.e. 100 cases. This is an accepted procedure in comparative mobility research (Erikson and Goldthorpe 1992). The 2200 pairs of brothers weighted are our units of analysis.

Context variables were constructed for each society, that is for each combination of country and labour market cohort. Modernization can be operationalized in many ways, for example by the percentage of the labour force working in agriculture, the average educational attainment or the gross national product per capita. Since these modernization indicators usually correlate highly, and since the number of degrees of freedom in our analyses is limited (there are only 22 societies), we chose to include one indicator of modernization, i.e. the energy consumption per capita.² Modern societies are characterized by a high level of mechanization and industrialization, which implies ‘the use of (. . .) inanimated energy (fossil fuels and water power) to replace or augment human power in the extraction, processing and distribution of natural resources or products derived therefrom’ (Davis 1955: 255). We chose to operationalize socialist ideology by only one indicator as well, i.e. the percentage of seats in parliament taken by social-democratic or communist parties. In societies with a communist regime, this percentage is 100 per cent by definition. Both the energy consumption per capita and the percentage of socialist seats in parliament were averaged over the ten years in each combination of country and labour market cohort. A more detailed description of the context variables can be found in Appendix B.

A SIBLING MODEL

Hauser and his associates (e.g. Hauser and Mossel 1985; Hauser and Wong 1989) developed linear-structural sibling models to estimate the impact of the family of origin on educational attainment and occupational status. We

start our analyses with one of these sibling models. Figure I shows this baseline model using the notation of LISREL (Jöreskog and Sörbom 1993). The top part of the model deals with the first brother in a pair who is, by definition, the older one. The bottom part deals with the younger brother in a sibling-pair. There are three indicators of family background (x_1 , x_2 and x_3) which are measured by parents' education (x_1), father's occupational status (x_2), and the number of siblings in a family (x_3). Because these three indicators are correlated, we set the variance-covariance matrix of the indicators (Φ) to be free for each country. A common family factor for educational attainment (η_5) is constructed out of the resemblance in educational attainment between the two brothers. The three measured indicators of family background affect this common family factor for educational attainment (γ_{51} , γ_{52} and γ_{53}). There are no direct effects of the measured indicators of family background on the individual educational attainments of the older (η_1) and of the younger brother (η_2), which are measured by y_1 and y_2 respectively. In the same way, the common family factor for occupational status (η_6) is represented by the resemblance in occupational status between the two brothers. There are only direct effects of the three measured indicators of family background on this common occupational status (γ_{61} , γ_{62} and γ_{63}). The individual occupational statuses of the older (η_3) and younger brother (η_4) are measured by y_3 and y_4 .

We constrained all coefficients in the measurement model to be equal to one. This does not only simplify our model, it also means that effects will be the same for the older and the younger brother. Earlier research showed that hardly any systematic differences exist in the impact of the family on educational attainment and occupational status between siblings (Hauser and Wong 1989; De Graaf and Huinink 1992; Van Eijck 1996). The individual effects of educational attainment on occupational status for

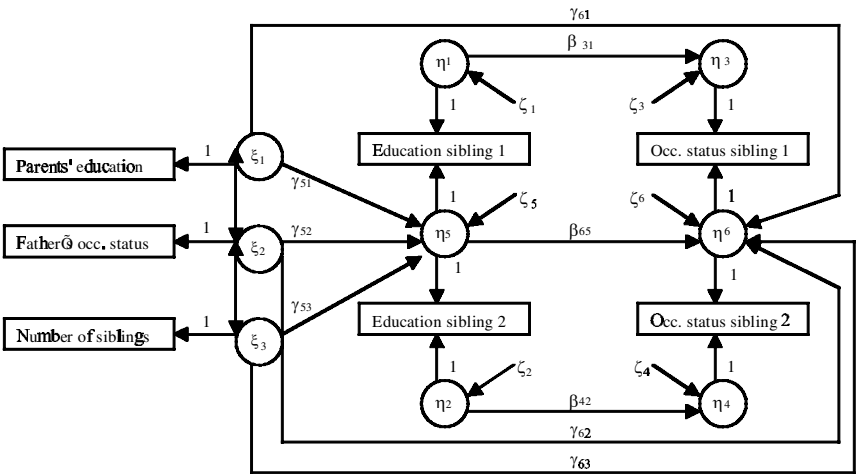


FIGURE I: Baseline sibling model

the older (β_{31}) and the younger brother (β_{42}) were constrained to be equal. Furthermore, these 'between family effects' were constrained to be equal to the 'within family effect' of educational attainment on occupational status (β_{65}). Modelling this equality constraint, we implied that there is no family bias in the effect of an individual's educational attainment on his occupational status. This is in line with the outcomes of previous research (Hauser and Mossel 1985; De Graaf and Huinink 1992). Finally, the error variance of the older brother's educational attainment (ζ_1) was set equal to the error variance of the younger brother's educational attainment (ζ_2). The same was done for the error variances of the older (ζ_3) and younger (ζ_4) brother's occupational status. The error variance of the common family factor for educational attainment (ζ_5) represented the unmeasured part of the family impact on educational attainment. The smaller this unmeasured part, the more the three indicators of family background (that is parents' educational attainment, father's occupational status, and the number of siblings in a family) covered the total family impact on educational attainment. The same holds for the error variance of the common family factor for occupational status (ζ_6).

ESTIMATION OF THE OVERALL BASELINE MODEL

We started our analyses with an estimation of the described baseline model for all 22 societies simultaneously; only the variance-covariance matrix (Φ) for the three measured indicators of family background varied across societies. The results of this analysis can be found in Table II. The lower part of the table refers to the fit of the model. The χ^2 of 1525.707 is significant with 473 degrees of freedom, which would imply that the model does not fit the data. However, the χ^2 should not be the sole basis for determining model fit, for it is overly rigid in most cases (Bollen and Long 1993). We, therefore, found our conclusions about the fit of the model not only on the χ^2 , but also on two other fit statistics. The Goodness of Fit Index (GFI) of Jöreskog and Sörbom (1993) ranges from zero to one. The GFI of our model is 0.869, which is close to the 'rule of thumb' minimum value of 0.90. Raftery (1993) proposes another fit statistic: the Bayesian Information Coefficient (BIC).³ If the model fits the data well, the BIC statistic is negative, and the more negative, the better the model fits. Our model has a BIC of -3098.177, which shows that the baseline model fits the data well; particularly since we do not see meaningful ways to improve the fit.⁴

The estimated parameters of the overall baseline model display the expected effects. Parents' education and father's occupational status both have a positive effect on educational attainment; the number of siblings in a family has a negative effect. With respect to occupational status, father's occupational status exerts a positive influence; the number of siblings has a negative effect, whereas the effect of parents' education is not statistically

TABLE II: *Parameter estimates of the overall baseline model (n = 2200)*

		Estimate	(s.e.)	Standardized estimate
<i>Effects on family factor for educational attainment:</i>				
Parental education	(γ_{51})	.262 **	(.018)	.395
Father's occupational status	(γ_{52})	.034 **	(.004)	.282
Number of siblings in family	(γ_{53})	-.106 **	(.019)	-.125
<i>Effects on family factor for occupational status:</i>				
Parental education	(γ_{61})	.002	(.022)	.001
Father's occupational status	(γ_{62})	.173 **	(.018)	.307
Number of siblings in a family	(γ_{63})	-.388 **	(.086)	-.097
Educational attainment	($\beta_{31} = \beta_{42} = \beta_{65}$)	2.778 **	(.077)	.434/.590 ^a
<i>Fit of the model</i>				
χ^2 (df = 473)		1525.707		
GFI		0.869		
BIC		-3098.177		

Notes:

^a the standardized solution displays different values for on the one hand β_{31} and β_{42} (.434) and for β_{65} (.590), because the standard deviations associated with these parameters differ in size.

** significant (p<0.01)

significant. The most important factor for occupational status is educational attainment.

But how large is the total family impact on educational attainment and occupational status and to what extent does the measured part (i.e. the traditional indicators of parental social class) represent this total impact? To answer these questions, we decomposed the components of variance in the overall baseline model. The second and third columns in Table III display this decomposition for educational attainment. We split up the variance in a between family and a within family component. The between family component refers to the variance attributable to parental resources, genetic inheritance, intersibling effects and all other aspects of shared environment. This between family component turns out to be 51.5 per cent of the variation in individual educational attainment. The within family component refers to the proportion of variance attributable to individual characteristics and is 48.5 per cent. Family characteristics are thus as important for educational attainment as individual characteristics are. Both the between and the within family component can be divided in an explained and an unexplained part. Table III shows that 45.1 per cent of the between family variance is explained by parents' educational attainment, father's occupational status, and number of siblings in a family, so the measured part represented about half of the family factor for educational attainment. The same was observed in previous sibling research, both with data on only one country (e.g. Hauser and Wong 1989; De Graaf

TABLE III: *Decomposition of components of variance in overall baseline model (n = 2200)*

	Educational attainment				Occupational status			
<i>Between family variance</i>	3.884	(51.5%)			86.156	(36.5%)		
Explained			1.750	(45.1%)		61.668	(71.6%)	
Unexplained			2.134	(54.9%)		24.488	(28.4%)	
<i>Within family variance</i>	3.663	(48.5%)			149.833	(63.5%)		
Explained			0.000	(0.0%)		28.272	(18.9%)	
Unexplained			3.663	(100.0%)		121.561	(81.1%)	
<i>Total variance</i>	7.547	(100.0%)			235.989	(100.0%)		

and Huinink 1992) and with several datasets in a comparative sibling approach (Sieben and De Graaf 2000). Since we did not include any individual characteristics explaining educational attainment, the proportion of within family variance explained is zero.

The same variance decomposition was made for occupational status. The between family variance, indicating the influence of shared environment, accounts for 36.5 per cent of all variance in occupational status, whereas the within family component is 63.5 per cent. Individual characteristics thus are more important for occupational status than the family. We also observed that occupational status is further away from the parental environment than educational attainment; the percentage of variance attributable to the family is lower for occupational attainment (36.5 per cent) than for educational attainment (51.5 per cent). The traditional indicators of parental social class and the family factor of educational attainment explain 71.6 per cent of the between family variance in occupational status. The same factors, apparently, predict both sibling similarity in educational attainment and sibling similarity in occupational status. The within family variance in occupational status can be explained by a less high proportion (18.9 per cent) which reflects the correlation between individual educational and occupational attainment.

DIFFERENCES BETWEEN SOCIETIES: MODERNIZATION AND SOCIALIST IDEOLOGY

The next step in our analyses is to find out which of the parameters of the overall baseline model vary systematically with modernization and socialist ideology across societies. We start from the overall baseline model and let the error variances $\zeta_1 = \zeta_2$, $\zeta_3 = \zeta_4$, ζ_5 , and ζ_6 vary across societies.⁵ We hypothesized effects of parents' education, father's occupational status, and number of siblings in a family on educational attainment and occupational status to be smaller in technologically advanced societies (modernization hypothesis) and in social-democratic and communist

societies (socialist ideology hypothesis). At the same time, the effect of educational attainment on occupational status would be larger in these societies. Rindskopf (1984) showed how to model these macro-effects in a LISREL-approach. Two latent variables without indicators attached to them were included in the model in order to estimate the influence of modernization and socialist ideology on the effects of family background and educational attainment. To make this clearer, we depicted a part of our sibling model in Figure II.

Figure II displays a model to determine if modernization can explain differences between societies in the effect of parents' education on the family factor for educational attainment (γ_{51}). This is done by introducing a latent variable with no observed indicator (η_7) into the model. In Rindskopf's terminology, this latent variable is called a phantom variable. If one fixes parameter β_{57} at the level of energy consumption for each society (e.g. $\beta_{57} = 3.968$ for England in 1916–1930), parameter γ_{71} displays the effect of modernization on γ_{51} . The same procedure is followed for the effects of modernization on the parameters γ_{52} , γ_{53} , γ_{61} , γ_{62} , γ_{63} , and $\beta_{31} = \beta_{42} = \beta_{65}$. Analogously, we estimate effects of socialist ideology on these parameters by introducing a second latent variable.

Table IV gives the results of these analyses. In the upper part of the table, the effects of modernization are shown: first for Models AM to GM in which only one parameter at the time systematically varies with modernization, then for Model HM in which the effects of modernization on all parameters are estimated together, and finally for Model HMS in which the effects of modernization and socialist ideology on all parameters are simultaneously modelled. The lower part of the table does the same with respect to socialist ideology. In Models AS to GS, the effects of socialist ideology on the parameters are estimated one by one, whereas in Model HS, the effects of socialism are modelled on all parameters simultaneously. Model HMS is again the model in which all parameters systematically vary with both modernization and socialist ideology. The fit statistics of these models can be found in Appendix C.

In Table IV, we observe that modernization has a small significantly negative influence on the effect of parents' education on educational

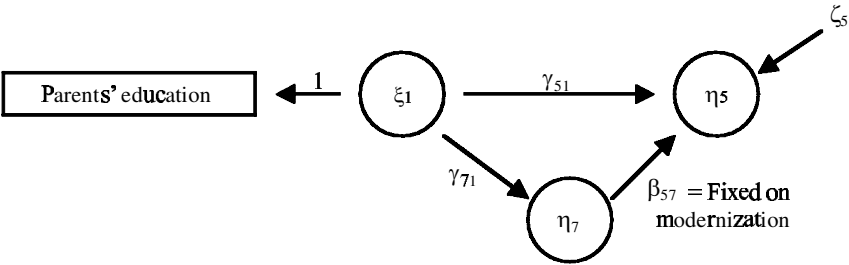


FIGURE II: Example of a phantom variable: the effect of modernization on γ_{51}

TABLE IV: *Sibling models with phantom variables: effects of modernization and socialist ideology (n = 2200)*

Effects of modernization on	Model AM–GM		Model HM		Model HMS	
γ_{51} : parental education – education (A)	–.007*	(.005)	–.004	(.006)	–.004	(.006)
γ_{52} : occ. status father – education (B)	–.002***	(.001)	–.002*	(.001)	–.002*	(.001)
γ_{53} : number of siblings – education (C)	–.002	(.006)	–.003	(.007)	–.004	(.007)
γ_{61} : parental education – occ. status (D)	.022	(.024)	–.047*	(.033)	–.018	(.033)
γ_{62} : occ. status father – occ. status (E)	.003	(.005)	–.004	(.006)	–.006	(.006)
γ_{63} : number of siblings – occ. status (F)	–.020	(.030)	.017	(.032)	.001	(.032)
$\beta_{31} = \beta_{42} = \beta_{65}$: education – occ. status (G)	.181***	(.043)	.271***	(.058)	.196***	(.057)

Effects of socialist ideology on	Model AS–GS		Model HS		Model HMS	
γ_{51} : parental education – education (A)	–.000	(.000)	–.000	(.000)	–.001	(.001)
γ_{52} : occ. status father – education (B)	.000	(.000)	.000	(.000)	.000	(.000)
γ_{53} : number of siblings – education (C)	.000	(.000)	.000	(.001)	.000	(.001)
γ_{61} : parental education – occ. status (D)	.004**	(.002)	–.001	(.002)	.001	(.003)
γ_{62} : occ. status father – occ. status (E)	–.000	(.000)	–.002***	(.001)	–.002***	(.001)
γ_{63} : number of siblings – occ. status (F)	–.006***	(.003)	–.002	(.003)	–.003	(.003)
$\beta_{31} = \beta_{42} = \beta_{65}$: education – occ. status (G)	.018***	(.004)	.031***	(.006)	.026***	(.006)

Notes:

- * significant (0.10<p<0.05)
- ** significant (0.05<p<0.01)
- *** significant (p<0.01)

attainment. The impact of modernization, however, disappears when we allow all effects to vary with modernization. The level of modernization in a society clearly affects the effect of father’s occupational status on educational attainment negatively. In addition, the impact of modernization on the effect of educational attainment on occupational status is significantly positive. These findings all corroborate the modernization hypothesis. In technologically more advanced societies, the impact of traditional indicators of parental social class on educational attainment is smaller and the effect of one’s educational attainment on occupational status is larger. At the same time, however, we see that modernization does not significantly influence the effect of the number of siblings in a family on educational attainment and occupational status, and the effects of parents’ education and father’s occupational status on occupational status. This is in contrast to the modernization hypothesis. The effects of family background on occupational status are not smaller in technologically advanced societies.

The lower part of Table IV shows that the percentage of socialist seats in parliament does not affect the relationship between family background and educational attainment. This is not in line with the socialist ideology hypothesis. In social-democratic and communist societies, the effects of parental social class on educational attainment are not different than in other societies. With respect to occupational attainment, however, we observe the effects expected. The percentage of socialist or communist

seats in parliament has a significantly negative influence on the effect of father's occupational status on occupational status. Socialist ideology also has a negative impact on the effect of the number of siblings in a family on occupational status, but this impact disappears when allowing all parameters to systematically vary with socialism. In general, effects of family background on occupational status are smaller in social-democratic and communist societies. Finally, the effect of educational attainment on occupational status is positively influenced by socialist ideology.

So far, we tested the modernization hypothesis and socialist ideology hypothesis for the effects of measured aspects of family background on educational attainment and occupational status. It is, however, equally important to test these hypotheses for the *total* impact of the family of origin.

All aspects of the family are combined in this total family impact: not only traditional indicators of parental social class, but also other parental resources, genetic inheritance, intersibling effects, and other aspects of shared environment. In Hauser's sibling models, the total family impact is defined as the resemblance in educational attainment or occupational status between the siblings (Hauser and Mossel 1985). This resemblance is brought about by all measured and unmeasured aspects of the family of origin. We represented the total family impact on educational attainment by the correlation between the educational attainment of the older brother and the educational attainment of the younger brother in a sibling-pair. Analogously, the total family impact on occupational status was represented by the correlation between the occupational statuses of the brothers. We used these correlation coefficients to determine the effects of modernization and socialist ideology on the total family impact.

The relationship between the total family impact on educational attainment and modernization is displayed in Figure III. The acronyms in this figure represent the total family impact of each society. The first three characters of an acronym refer to a specific country, the last two characters to the first year of a specific labour market cohort. Thus, 'spa46' refers to the country 'Spain' in the labour market cohort '1946-1960'. Figure III shows that the total family impact on educational attainment varies per society. The average correlation coefficient between brothers' educational attainments across all societies is .450 with a standard deviation of .110. However, there is no link between this total family impact on educational attainment and modernization. The regression line displayed in Figure III is practically horizontal, and the correlation coefficient between the total family impact and the level of energy consumption per capita is not significant ($r = -.054$). The modernization hypothesis thus cannot be corroborated; in technologically advanced societies, the family has not lost its importance in determining educational attainment.

Figure IV shows that there also is no relationship between the total family impact on educational attainment and socialism. The regression line is almost flat, and the correlation coefficient between the total family impact and the percentage of socialist or communist seats in parliament is not

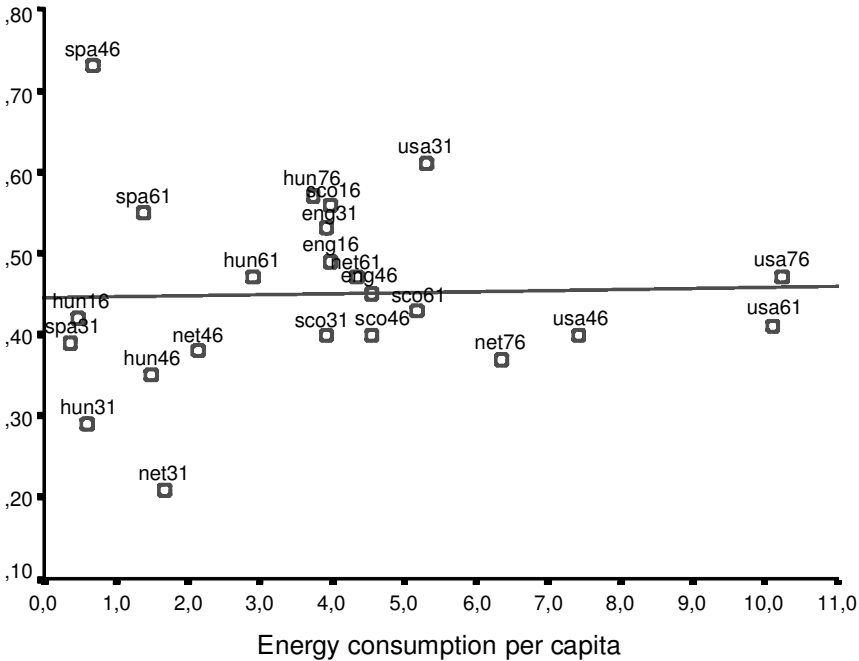


FIGURE III: Relationship between the total family impact on educational attainment and modernization ($r = -.054$)

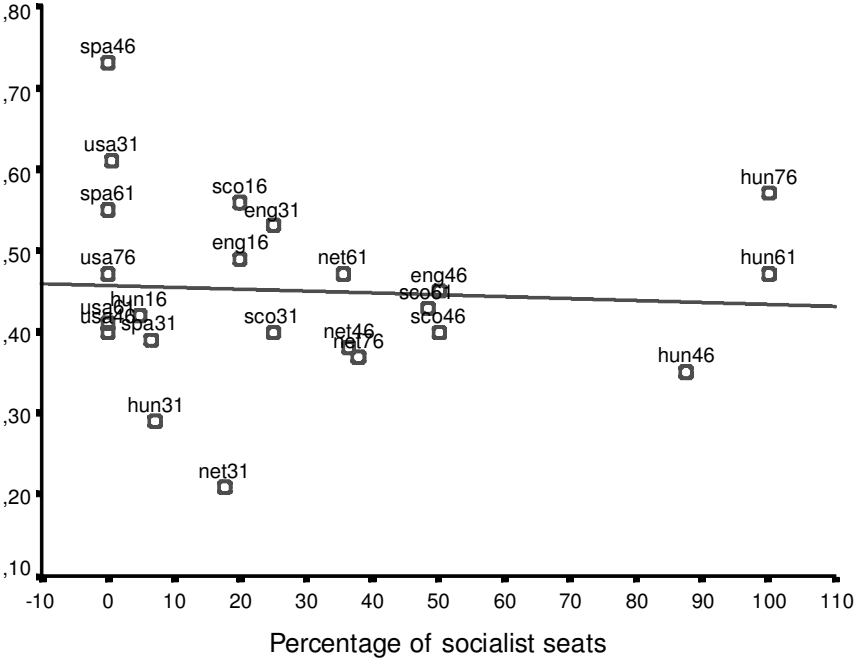


FIGURE IV: Relationship between the total family impact on educational attainment and socialist ideology ($r = -.120$)

significant ($r = -.120$). The socialist ideology hypothesis, therefore, has to be rejected too. Political circumstances do not have any effect on the impact of the family on educational attainment.

We now turn to the total family impact on occupational status. Figure V shows that this family impact varies across societies. The average correlation coefficient between brothers' occupational statuses is .362 with a standard deviation of .108. There is a clear relationship between the total family impact on occupational status and modernization. The regression line in Figure V has a negative slope, and the correlation coefficient between the total family impact and the level of energy consumption per capita is significantly negative ($r = -.439$). The impact of the family on occupational status is smaller in technologically advanced societies, which corroborates the modernization hypothesis.

Figure VI displays the relationship between the total family impact on occupational status and socialism. The regression line shows a positive effect of the percentage of socialist or communist seats in parliament, and the correlation coefficient between the total family impact and socialist ideology is significantly positive ($r = .436$). These outcomes completely contrast the socialist ideology hypothesis. Socialist reforms did not weaken, but strengthen the importance of the family for occupational status.

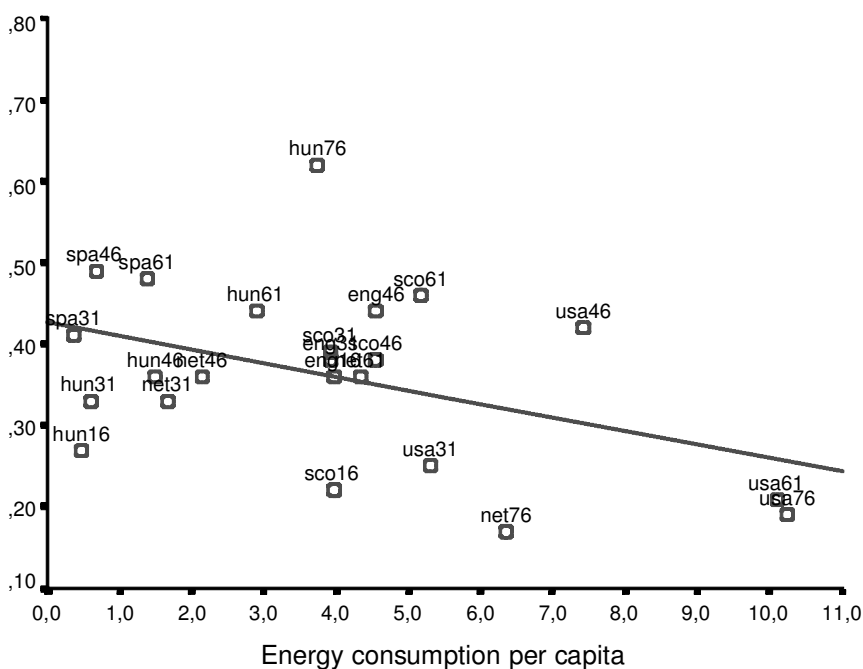


FIGURE V: Relationship between the total family impact on occupational status and modernization ($r = -.439$)

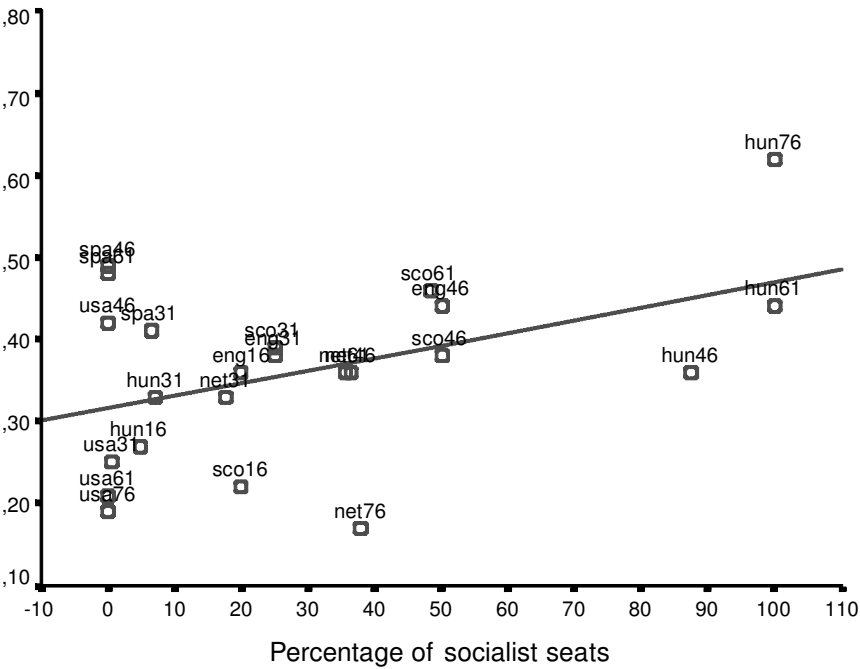


FIGURE VI: *Relationship between the total family impact on occupational status and socialist ideology ($r = .436$)*

CONCLUSIONS

In this study, we employed a comparative sibling analysis. We observed that 52 per cent of the variance in individual educational attainment, and 36 per cent of the variance in individual occupational status can be attributed to the family. Traditional indicators of parental social class account for about half (45 per cent) of this between family variance in educational attainment, and for 72 per cent of the between family variance in occupational status. These findings are in line with the outcomes of previous sibling research (e.g. Hauser and Sewell 1986), and they show that the total impact of the family on educational attainment and occupational status is much larger than can be measured by traditional indicators of parental social class.

We tested two major social mobility hypotheses. The first one, the modernization hypothesis, predicts that the impact of the family on educational attainment and occupational status will be smaller in technologically advanced societies because of modernization processes that have taken place in these societies. The analyses showed that this prediction is in keeping with the effects of traditional indicators of parental social class on educational attainment, since the impact of parents' education and father's occupational status are negatively affected by modernization.

These results are in line with the results of Treiman and Yip (1989). On the other hand, it seems that parents have successfully compensated for this loss, because the total family impact on educational attainment was not related to modernization. Apparently, parents have (consciously or unconsciously) used other strategies than social class related resources to influence their sons' schooling. Although it is not easy to determine what these compensating strategies are, our outcomes show that in technologically advanced societies the family has not lost its importance for educational attainment. An interpretation for the constant influence of the family might be in the very observation that financial and cultural barriers have become less important in modern societies. Parents can now decide which educational level is appropriate for their children. If they use this new freedom to aim at equal levels of education for all their sons, the total family impact would increase with modernization. This tendency might compensate the decreasing effect of social class.

Regarding the impact of the family on occupational status, we observe that effects of parental social class are not related to modernization. However, the modernization hypothesis is confirmed by the negative influence of the level of energy consumption per capita on the total family impact on occupational status. Apparently, parents cannot influence the occupational careers of their sons as much as the educational careers. Parents have fewer strategies available to equalize the occupational opportunities of their sons, which is in line with the observation that parents can influence their children only when they are relatively young and are living at home. In general, however, we conclude that the trend from 'ascription' to 'achievement' that is said to have taken place in technologically advanced societies is only partly observed.

The second social mobility hypothesis, socialist ideology hypothesis, states that reforms in social-democratic and communist societies will weaken the impact of the family on educational attainment and occupational status in these societies. Our results showed, however, that parents' education, father's occupational status, and the number of siblings in a family have the same impact on educational attainment in social-democratic and communist societies as in other societies. In addition, the total impact of the family on educational attainment is not affected by the number of seats in parliament taken by socialist or communist parties. This means that social reforms implemented to reduce educational inequality have not been very effective in social-democratic and communist societies. In contradiction to the socialist ideology hypothesis, the family of origin remains very important for educational attainment in these societies.

In line with the socialist ideology hypothesis, the effect of father's occupational status on occupational status is smaller in social-democratic and communist societies. The same holds for the effect of the number of siblings in a family on occupational status. The total family impact on occupational status, however, is not smaller in social-democratic and communist societies. On the contrary, the impact of the family is positively related to

the percentage of socialist or communist seats in parliament. This might be caused by the following mechanism. Siblings resemble each other in educational attainment (in all societies). Since the effect of educational attainment on occupational status was so much higher in social-democratic and communist societies, this has led to a larger resemblance in occupational status between siblings. In short, our results imply that the social reforms in social-democratic and communist societies were effective in reducing the direct inheritance of status positions, but they were not able to diminish the importance of the family for occupational status.

With this study, we hoped to prove that sibling analysis is of value for comparative social mobility research. If we had incorporated only measured indicators of parental social class in our models, and had not estimated the total impact of the family on educational attainment and occupational status, our conclusions with respect to the modernization hypothesis and the socialist ideology hypothesis would have been different. Comparative sibling analysis sheds new light on the total impact of the family on educational attainment and occupational status. The major conclusion is that the family has not lost its importance yet. It is, however, difficult to determine the exact content of this total family impact. Next to parental social class, other parental resources may play a role, as well as genetic inheritance, intersibling effects, and all other aspects of shared environment. In our opinion, the main attraction of future comparative sibling research does not lie in opening this black box. Research shows that additional measures of parental resources do not increase the explained proportion of variance very much (Van Eijck 1996).⁶ Moreover, sibling models cannot improve our insight into the effects of genetic inheritance, since these effects are found in both the impact of traditional indicators of parental social class and in the remaining part of the total family impact. Other designs, like adoption/twin designs, are needed in order to estimate the influence of inherited genes, but these designs are also not unproblematic.⁷ We think that comparative sibling research should focus on what it is good at, namely estimating the total impact of the family. In this respect, a closer look at the mechanisms behind modernization and socialist ideology would improve our understanding of the impact of the family in the process of stratification.

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APPENDIX A: *Overview of data used in this paper*

Dataset	Country	Time-Period	Maximum number of siblings in dataset
Halsey, A. H., Goldthorpe, J. H., Payne, C., and Heath, A. F. 1978 <i>Oxford Social Mobility Inquiry</i> 1972, Oxford: Oxford Social Mobility Group.	England	1916–1960	Max 1 sibling: random out of all brothers older than 16
Harcza, I., and Kulsar, R. 1983 <i>Social Mobility Study Hungary</i> 1983, Budapest: Central Statistical Office.	Hungary	1916–1975	Max 7 siblings
Central Statistical Office 1992 <i>Hungarian Social Mobility and Life History Survey</i> 1992, Budapest: Central Statistical Office.	Hungary	1931–1990	Max 6 siblings
Ultee, W. C., and Ganzeboom, H. B. G. 1993 <i>Family Survey Dutch Population 1992/1993</i> , Nijmegen: Department of Sociology, Nijmegen University.	Netherlands	1946–1990	Max 9 siblings: if more than 9, the ones that come closest to respondent in age
De Graaf, N. D., De Graaf, P. M., Kraaykamp, G., and Ultee, W. C. 1999 <i>Family Survey Dutch Population 1998</i> , Nijmegen: Department of Sociology, Nijmegen University.	Netherlands	1946–1990	Max 3 siblings: random out of all siblings
Moore, R., and Payne, G. 1975 <i>Scottish Mobility Study</i> 1974–1975, Aberdeen: University of Aberdeen.	Scotland	1916–1975	Max 1 sibling: random out of all brothers older than 16
Centro de Investigaciones Sobre la Realidad Social 1991 <i>Cires Monthly Survey, May 1991: Education and Social Mobility</i> , Madrid: A.S.E.P. Inc.	Spain	1931–1975	Max 2 siblings: eldest and youngest older than 18
Davis, J., Coleman, J., Nie, N., Riley, J., and Jencks, C. 1973 <i>NORC Amalgam Survey, December 1973</i> , Chicago: National Opinion Research Center.	USA	1916–1960	Max 1 sibling: eldest
Davis, J. A. and Smith, T. W. 1996 <i>General Social Survey</i> 1994, Chicago: National Opinion Research Center.	USA	1931–1990	Max 1 sibling: random out of all siblings

APPENDIX B: *Context variables for each society (country-cohort combination)*

Society	Energy consumption per capita ^a	Socialist seats in parliament ^b
England		
1916–1930	3.968 ^c	20.0
1931–1945	3.932 ^c	25.0
1946–1960	4.554	50.2
Hungary		
1916–1930	0.481 ^c	4.7
1931–1945	0.597 ^c	7.2
1946–1960	1.498	87.4
1961–1975	2.896	100.0
1976–1990	3.745	100.0

Continued

APPENDIX B: *Continued*

Society	Energy consumption per capita ^a	Socialist seats in parliament ^b
The Netherlands		
1931–1945	1.668 ^c	17.6
1946–1960	2.143	36.4
1961–1975	4.328	35.7
1976–1990	6.343	38.0
Scotland		
1916–1930	3.968 ^c	20.0
1931–1945	3.932 ^c	25.0
1946–1960	4.554	50.2
1961–1975	5.175	48.4
Spain		
1931–1945	0.370 ^c	6.5
1946–1960	0.673	0.0
1961–1975	1.389	0.0
USA		
1916–1930	5.884	0.3
1931–1945	5.312	0.6
1946–1960	7.432	0.0
1961–1975	10.103	0.0
1976–1990	10.249	0.0

Notes:

- a The energy consumption in tonnes of coal equivalent per capita was based on the average energy consumption of all years in a particular cohort and refers to the apparent consumption of coal, lignite, petroleum products, natural gas, and hydro and nuclear electricity. Coke, manufactured gas and electricity internationally traded were considered to have been consumed by the importing country. Figures were based on Banks (1983) and United Nations (several years).
- b The percentage of seats won by social-democratic or communist parties in parliament was based on the average percentage of all years in that cohort. To compute this average, percentages were assigned to all years. Years between two elections were assigned the percentage of seats won in the previous election. If an election was held in the first half of a year, then the percentage of seats won in that election counted for that year. If an election was, however, held in the second half of a year, the percentage of seats won in that election counted not for the following year. Figures are based on Mackie and Rose (1991) and Nohlen (1969). More information about parties and elections in these societies is available on request from the first author.
- c No information is available for the period of the Second World War (1940–1945). Following Banks (1983), we estimated the consumption of energy by using a linear imputation based on the scores of before (1939) and after (1946) the war. For the missing observations during the First World War (1916–1918), we had to adopt a different strategy, because there is only information available on the consumption of energy *after* this war. Therefore, we estimated a linear regression equation for data from the period 1919–1925, with energy consumption as the dependent variable and year (in two digits) as the independent variable. For England, the equation is $3.319 + 0.0287 * \text{year}$; for the USA $2.84071 + 0.1342 * \text{year}$ and for Hungary $-0.725 + 0.0528 * \text{year}$. We used these equations to compute the missing levels of energy consumption for the period 1916–1919.

APPENDIX C: Fit statistics of models in which parameters of the overall baseline model vary across societies

	χ^2	df	p	GFI	BIC	Contrast	$\delta(\chi^2)$	$\delta(df)$	p
Model O: overall baseline model + varying $\zeta_1 = \zeta_2, \zeta_3 = \zeta_4, \zeta_5, \zeta_6$	434.72	389	0.06	0.92	-3368.01				
Model AM: γ_{51} varying with modernization	432.95	388	0.06	0.92	-3660.00	O-AM	1.77	1	0.18
Model AS: γ_{51} varying with socialism	434.06	388	0.05	0.92	-3258.29	O-AS	0.06	1	0.82
Model BM: γ_{52} varying with modernization	430.66	388	0.07	0.92	-3362.30	O-BM	4.06	1	0.04
Model BS: γ_{52} varying with socialism	434.31	388	0.05	0.92	-3358.65	O-BS	0.41	1	0.52
Model CM: γ_{53} varying with modernization	434.60	388	0.05	0.92	-3358.35	O-CM	0.12	1	0.73
Model CS: γ_{53} varying with socialism	434.69	388	0.05	0.92	-3358.26	O-CS	0.03	1	0.87
Model DM: γ_{61} varying with modernization	433.92	388	0.05	0.92	-3259.04	O-DM	0.80	1	0.37
Model DS: γ_{61} varying with socialism	431.35	388	0.06	0.92	-3361.61	O-DS	3.37	1	0.07
Model EM: γ_{62} varying with modernization	434.42	388	0.05	0.92	-3358.53	O-EM	0.30	1	0.59
Model ES: γ_{62} varying with socialism	434.39	388	0.05	0.92	-3358.57	O-ES	0.33	1	0.57
Model FM: γ_{63} varying with modernization	434.28	388	0.05	0.92	-3358.68	O-FM	0.44	1	0.02
Model FS: γ_{63} varying with socialism	429.64	388	0.07	0.92	-3363.32	O-FS	5.08	1	0.00
Model GM: $\beta_{31} = \beta_{42} = \beta_{65}$ varying with modernization	418.34	388	0.14	0.93	-3374.62	O-GM	16.38	1	0.00
Model GS: $\beta_{31} = \beta_{42} = \beta_{65}$ varying with socialism	406.33	388	0.25	0.91	-3386.62	O-GS	28.38	1	0.00
Model HM: all varying with modernization	408.69	382	0.17	0.92	-3325.61	O-HM	26.03	7	0.00
Model HS: all varying with socialism	385.22	382	0.44	0.91	-3349.08	O-HS	49.50	7	0.00
Model HMS: all varying with modernization and socialism	368.00	375	0.59	0.93	-3297.87	O-HMS	66.71	14	0.00

NOTES

1. In a companion study, in which we present a comparative sibling analysis of the effects of family background on educational attainment only, we included both men and women in our analysis (Sieben and De Graaf 2000).

2. We also estimated models with another indicator of modernization, i.e. the percentage of the labour force working in agriculture. The correlation between this indicator and the energy consumption per capita was $-.71$. The results of these additional analyses gave way to the same conclusions as the results presented here.

3. $BIC = \chi^2 - df * \log(n/k)$ with χ^2 = Chi-squared statistic of the model
 df = number of degrees of freedom
 n = sample size
 k = number of observed variables.

The Bayesian Information Criterion has been criticized by Weakliem (1999) as an instrument for model selection. Raftery (1999) and Xie (1999), however, argue that the BIC remains a very useful instrument. In this paper, we base our choice for the baseline sibling model estimated first and foremost on theoretical arguments. Moreover, we do not rely on one measure of model fit exclusively, but discuss three measures, i.e. χ^2 , GFI, and BIC.

4. Relaxing the constraints imposed does not significantly improve the fit of the baseline sibling model, with the exception of allowing effects of family background on educational attainment to vary between the older and the younger brother ($\lambda_{25} \neq 1$). However, a clear pattern in these effects cannot be discerned. Most societies hardly show any differences between the older and the younger brother; in some societies effects of family background on educational attainment are larger for the older brother, and in some societies these effects are larger for the younger brother. Moreover, our focus in this paper is not on differences in effects of family background within families, but on differences between families. We, therefore, chose a model with the constraints mentioned.

5. This model has a χ^2 of 434.718 with 389 degrees of freedom. Compared to the overall baseline model, this is a significant

improvement. Furthermore, the GFI increases to 0.917 and the BIC statistic is stronger negative (-3368.012) than in the overall baseline model. (See Model O in Appendix C).

6. The proportion of explained variance increases only slightly if additional measures of parental resources are included, because the resources and the traditional indicators of parental social class are relatively highly correlated.

7. To distinguish between effects due to environment and effects due to genes, a combination of adoption and twin studies could be used. A study of Lichtenstein, Pedersen and McClearn (1992) on Swedish twins reared apart and together shows that environmental effects on educational and occupational attainment are smaller than genetic effects. This holds particularly for men and for the younger age groups. However, adoption/twin designs also have disadvantages. First of all, these designs are based on additional assumptions that are 'both implausible and restrictive' (Hauser and Wong 1989: 151). A second disadvantage of adoption/twin designs is that adoption agencies select only specific families for adoption, namely those that can provide a stable home environment. They prefer married couples with high educational attainments and stable occupations. This means that twins reared apart often live in quite similar circumstances, and that the variation in environment is not very large. A third disadvantage of adoption/twin designs is that they are not very suitable for comparative research, because data on adopted twins are not easy to find, and hardly ever are nationally representative.

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